

CLAIMS

What is claimed is:

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A network access server (NAS) providing a connection to a user in a data  
5 communications network, said NAS capable of communicating with a home gateway

server (HGS) maintaining a pool of IP addresses for allocation to authorized users  
associated with the NAS, said NAS comprising:

a first memory location for storing an identification of a user;

an authenticator for asking the HGS for an IP address on behalf of the user; and

10 a second memory location associated with the first memory for storing the IP  
address of the user received from the HGS.

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2. The network access server of claim 1, further comprising:

a detector for periodically detecting connection of the user to the NAS;

15 a keep-alive sender for periodically informing the HGS that the user is still  
connected to the NAS.

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3. The network access server of claim 1, further comprising:

20 a receiver for receiving periodic queries from the HGS about the status of the user  
connection to the NAS;

a responder responsive to said periodic queries for informing the HGS that the user  
is still connected to the NAS.

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4. The network access server of claim 1, further comprising:  
a receiver for receiving periodic signals from the user;  
a forwarder responsive to said receiver for forwarding information to the HGS  
that the user is still connected to the NAS.

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5. The network access server of claim 1, further comprising:  
an HGS identifier responsive to log-in information provided by the user for  
identifying an HGS to which to forward the user's request for an IP address.

10 6. The network access server of claim 2, further comprising:

an HGS identifier responsive to log-in information provided by the user for  
identifying an HGS to which to forward the user's request for an IP address.

7. The network access server of claim 3, further comprising:

15 an HGS identifier responsive to log-in information provided by the user for  
identifying an HGS to which to forward the user's request for an IP address.

8. The network access server of claim 4, further comprising:

an HGS identifier responsive to log-in information provided by the user for  
20 identifying an HGS to which to forward the user's request for an IP address.

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The network access server of claim 1, further comprising:

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An HGS identifier responsive to call information associated with the incoming line used by the user to access the NAS for identifying an HGS to which to forward the user's request for an IP address.

10. The network access server of claim 2, further comprising:

5 An HGS identifier responsive to call information associated with the incoming line used by the user to access the NAS for identifying an HGS to which to forward the user's request for an IP address.

11. The network access server of claim 3, further comprising:

10 An HGS identifier responsive to call information associated with the incoming line used by the user to access the NAS for identifying an HGS to which to forward the user's request for an IP address.

12. The network access server of claim 4, further comprising:

15 An HGS identifier responsive to call information associated with the incoming line used by the user to access the NAS for identifying an HGS to which to forward the user's request for an IP address.

13. The network access server of claim 1, further comprising:

20 a generator, responsive to the receipt of a disconnection request from the user, for generating and sending a notice to the HGS that the user is no longer connected to the NAS.

14. The network access server of claim 2, further comprising:  
a generator, responsive to the receipt of a disconnection request from the user, for  
generating and sending a notice to the HGS that the user is no longer connected to the  
NAS.

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15. The network access server of claim 3, further comprising:  
a generator, responsive to the receipt of a disconnection request from the user, for  
generating and sending a notice to the HGS that the user is no longer connected to the  
NAS.

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16. The network access server of claim 4, further comprising:  
a generator, responsive to the receipt of a disconnection request from the user, for  
generating and sending a notice to the HGS that the user is no longer connected to the  
NAS.

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17. The network access server of claim 1, further comprising:  
a relayer responsive to the IP address for the user received from the HGS for  
informing the user of its IP address.

20 18. The network access server of claim 2, further comprising:

a relayer responsive to the IP address for the user received from the HGS for  
informing the user of its IP address.

19. The network access server of claim 3, further comprising:  
a relayer responsive to the IP address for the user received from the HGS for  
informing the user of its IP address.

5 20. The network access server of claim 4, further comprising:  
a relayer responsive to the IP address for the user received from the HGS for  
informing the user of its IP address.

*Sub A* 21. A method for providing an IP address to a user in a data communications

10 network, the method comprising:  
establishing a connection with a user;  
receiving an identification and a request for an IP address from the user;  
storing the identification in memory;  
requesting the IP address from a home gateway server (HGS) on behalf of the  
15 user;  
receiving the IP address from a remote server;  
storing the IP address in memory; and  
transmitting the IP address to the user.

*Sub B* 20 22. The method of claim 21, further comprising:

detecting a continuing connection with the user; and  
sending periodic keep-alive messages associated with the user to the remote  
server for as long as continued connection with the user is detected.

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23. The method of claim 21, further comprising:  
receiving periodic queries from the HGS about the status of the user connection;  
and  
5 responding to said periodic queries that the user is still connected.

24. The method of claim 21, further comprising:  
receiving periodic in-use signals from the user; and  
forwarding information to the HGS that the user is still connected.

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25. The method of claim 24, further comprising:  
identifying an HGS to which to forward the user's request for an IP address, said  
identifying in response to call information associated with an incoming line used by the  
user.

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26. A program storage device readable by a machine, tangibly embodying a program  
of instructions readable by the machine to perform a method for providing an IP address  
to a user in a data communications network, the method comprising:  
establishing a connection with a user;  
20 receiving an identification and a request for an IP address from the user;  
storing the identification in memory;  
requesting the IP address from a home gateway server (HGS) on behalf of the  
user;

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receiving the IP address from a remote server;  
storing the IP address in memory; and  
transmitting the IP address to the user.

5 27. The method of claim 26, further comprising:  
detecting a continuing connection with the user; and  
sending periodic keep-alive messages associated with the user to the remote  
server for as long as continued connection with the user is detected.

10 28. The method of claim 26, further comprising:  
receiving periodic queries from the HGS about the status of the user connection;  
and  
responding to said periodic queries that the user is still connected.

15 29. The method of claim 26, further comprising:  
receiving periodic in-use signals from the user; and  
forwarding information to the HGS that the user is still connected.

30. A home gateway server (HGS) capable of communication with a network access  
20 server, said network access server (NAS) capable of communicating with a user, the  
home gateway server comprising:  
an IP address pool maintainer maintaining access to a pool of IP addresses;  
a user identification maintainer maintaining the identification of a user;

an allocator for allocating an IP address to the user, said IP address allocated from the pool of IP addresses;

5 a memory for storing the IP address allocated to the user;

a sender for sending the IP address to the NAS for relaying to the user; and

10 a keep-alive message receiver for receiving keep-alive messages, said keep-alive messages originating from the NAS and indicating that the user is using the IP address.

31. A home gateway server (HGS) capable of communication with a network access server, said network access server (NAS) capable of communicating with a user, the

15 home gateway server comprising:

an IP address pool maintainer maintaining access to a pool of IP addresses;

a user identification maintainer maintaining the identification of a user;

15 an allocator for allocating an IP address to the user, said IP address allocated from the pool of IP addresses;

a memory for storing the IP address allocated to the user;

20 a sender for sending the IP address to the NAS for relaying to the user; and

a in-use message receiver for receiving in-use messages, said in-use messages originating from the user and forwarded from the NAS and indicating that the user is using the IP address.

32. A home gateway server (HGS) capable of communication with a network access server, said network access server (NAS) capable of communicating with a user, the home gateway server comprising:

an IP address pool maintainer maintaining access to a pool of IP addresses;  
a user identification maintainer maintaining the identification of a user;  
an allocator for allocating an IP address to the user, said IP address allocated from  
the pool of IP addresses;

5        a memory for storing the IP address allocated to the user;  
a sender for sending the IP address to the NAS for relaying to the user;  
a query sender for sending queries to the NAS as to whether the user is connected  
to the NAS; and

10      a response-to-query message receiver for receiving response-to-query messages in  
response to queries, said response-to-query messages indicating that the user is using the  
IP address.

33.     The home gateway server of claim 30, further comprising:

15      a disconnect notice receiver for receiving a disconnect notice originating from the  
user and forwarded from the NAS indicating that the user is no longer using the IP  
address.

34.     The home gateway server of claim 31, further comprising:

20      a disconnect notice receiver for receiving a disconnect notice originating from the  
user and forwarded from the NAS indicating that the user is no longer using the IP  
address.

35.     The home gateway server of claim 32, further comprising:

a disconnect notice receiver for receiving a disconnect notice originating from the user and forwarded from the NAS indicating that the user is no longer using the IP address.

5 36. A method for providing a network access server (NAS) an IP address for use by a user in a data communications network, the method comprising:

allocating an IP address for use by the user from a pool of IP addresses; and

sending the IP address to the network access server; and

receiving keep-alive messages associated with the user, said keep-alive messages

10 originating from the NAS and indicating that the user is using the IP address.

37. A method for providing a network access server (NAS) an IP address for use by a user in a data communications network, the method comprising:

allocating an IP address for use by the user from a pool of IP addresses;

15 sending the IP address to the network access server; and

receiving in-use messages associated with the user, said in-use messages

originating from the user and forwarded from the NAS and indicating that the user is using the IP address.

20 38. A method for providing a network access server (NAS) an IP address for use by a user in a data communications network, the method comprising:

allocating an IP address for use by the user from a pool of IP addresses;

sending the IP address to the network access server;

sending queries as to whether the user is using the IP address; and  
receiving response-to-query messages in response to said queries, said response-to-query messages indicating that the user is using the IP address.

5 39. The method of claim 36, further comprising:

receiving a disconnect notice originating from the user and forwarded from the  
NAS indicating that the user is no longer using the IP address.

10 40. The method of claim 37, further comprising:

receiving a disconnect notice originating from the user and forwarded from the  
NAS indicating that the user is no longer using the IP address.

15 41. The method of claim 38, further comprising:

receiving a disconnect notice originating from the user and forwarded from the

15 NAS indicating that the user is no longer using the IP address.

20 42. A program storage device readable by a machine, tangibly embodying a program  
of instructions readable by the machine to perform a method for providing a network  
access server (NAS) an IP address for use by a user in a data communications network,  
the method comprising:

allocating an IP address for use by the user from a pool of IP addresses;  
sending the IP address to the network access server; and

receiving keep-alive messages associated with the user, said keep-alive messages originating from the NAS and indicating that the user is using the IP address.

43. A program storage device readable by a machine, tangibly embodying a program of instructions readable by the machine to perform a method for providing a network access server (NAS) an IP address for use by a user in a data communications network, the method comprising:

allocating an IP address for use by the user from a pool of IP addresses;

sending the IP address to the network access server;

10 receiving in-use messages associated with the user, said in-use messages originating from the user and forwarded from the NAS and indicating that the user is using the IP address.

15 44. A program storage device readable by a machine, tangibly embodying a program of instructions readable by the machine to perform a method for providing a network access server (NAS) an IP address for use by a user in a data communications network, the method comprising:

allocating an IP address for use by the user from a pool of IP addresses;

20 sending the IP address to the network access server;

sending queries as to whether the user is using the IP address; and

receiving response-to-query messages in response to said queries, said response-to-query messages indicating that the user is using the IP address.

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